

United States of America

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda Item 1.12c: to consider allocations and regulatory issues related to the space science services in accordance with Resolution **723 (Rev. WRC-2000)** and to review all Earth exploration-satellite service and space research service allocations between 35 and 38 GHz, taking into account Resolution **730 (WRC-2000)**;

Background Information: Resolution **723 (Rev. WRC-2000)** *resolves 4*, recommends that WRC-03 consider a review of existing allocations to space science services near 15 GHz and 26GHz, with a view to accommodating wideband space-to-Earth space research applications. This *resolves* is in response to a need for allocations to support planned high data rate space research missions requiring bandwidths up to 400 MHz. Spacecraft for these missions will carry telescopes to conduct sky surveys or Space Very Long Baseline Interferometry (SVLBI) observations. They may also carry other passive instruments to measure phenomenon such as the Earth's magnetosphere and solar flares. These missions will be limited in number and will generally be in a polar or equatorial orbit, with some at geostationary altitudes; highly elliptical orbit; or at the L1 or L2 Sun/Earth equilibrium libration points that are approximately 1.9 M km from Earth.

In response to Resolution **723 (WRC-2000)**, ITU-R studies have shown that both the 15 GHz and 26 GHz bands are suitable for primary allocation to satisfy these requirements. Each band offers its own compelling and particular set of advantages for space research service (SRS) missions' support. The 15 GHz band is most desirable for high data rate SRS missions operating in low-to-mid inclination orbits, geostationary orbits, and L1/L2 libration points due to the possible sharing of ground station resources located at low-to-mid latitude Deep Space Network (DSN) and National Radio Astronomy Observatory (NRAO) sites. Similarly, the 26 GHz band is most desirable for high data rate SRS missions operating in high inclination orbits due to the possible sharing of ground station resources with Earth exploration satellite service (EESS) missions operating in that band. Sharing of ground station resources can result in substantial cost and schedule benefits for international space agencies implementing high rate SRS missions. The 26 GHz band also affords SRS missions the flexibility of using a wide bandwidth space-to-space link in an existing or planned data relay satellite network as well as wide bandwidth space-to-earth links.

The 14.8-15.35 GHz band is currently allocated to the fixed and, mobile services on a primary basis and to the space research service on a secondary basis. The band 15.2-15.35 GHz is allocated to the space research service (passive) and to the Earth exploration-satellite service (passive) on a secondary basis by No. **5.339**.

ITU-R studies have demonstrated the feasibility of sharing between the space research service and other services currently allocated on a primary basis in the 14.8-15.35 GHz band.

With respect to co-ordination and notification procedures, the current provisions of Articles **9** and **11** and the proposed sharing criteria will continue to apply among the fixed, mobile and space research services in the band 14.8-15.35 GHz.

The 25.5-27.0 GHz band is currently allocated to the fixed, mobile, inter-satellite and Earth exploration-satellite services on a primary basis. The EESS primary allocation supports high data rate

EESS (space-to-earth) links, while space-to-space links in data relay satellite networks are supported under the Inter-Satellite Service (ISS) allocation.

The use of the allocations is constrained by RR footnotes: **5.536** sets conditions on the use of the band by stations in the inter-satellite service (ISS); **5.536A** limits the protection afforded EESS earth stations from the emissions of stations in the fixed and mobile services; and, **5.536B** further limits the protection and status of EESS earth stations in a number of countries.

ITU-R studies have similarly demonstrated the feasibility of sharing between the space research service and other services currently allocated on a primary basis in the 25.5-27.0 GHz band.

Proposal:

USA/ /1 MOD

14.8-15.35		
Allocation to services		
Region 1	Region 2	Region 3
14.8-15.35	FIXED MOBILE Space research service <u>SPACE RESEARCH</u> 5.339	

Reasons: To upgrade the SRS to a primary allocation to satisfy requirements for high data rate space science missions.

USA/ /2 MOD

25.5-27 GHz		
Allocation to Services		
Region 1	Region 2	Region 3
25.5-27	EARTH EXPLORATION-SATELLITE (space-to Earth) 5.536A-5.536B FIXED INTER-SATELLITE 5.536 MOBILE <u>SPACE RESEARCH (space-to-Earth)</u> Standard frequency and time signal-satellite (Earth-to-space) MOD 5.536A	

Reasons: To add a primary space research service (space-to-Earth) allocation to the Table of Allocations and to show that the footnote **5.536A** will apply to the space research service as well as the Earth exploration-satellite service.

USA/ /3 MOD

5.536A Administrations installing Earth exploration-satellite service or space research service earth stations cannot claim protection from stations in the fixed and mobile services operated by neighbouring administrations. In addition, earth stations operating in the Earth exploration-satellite

service and space research service should take into account Recommendations ITU-R SA.1278 and ITU-R SA.[26SHAR], respectively.

Reasons: This change amends RR footnote **5.536A** to include SRS earth stations and to give them the same status as Earth exploration-satellite service earth stations.

Table S21-4

	Frequency band	Service*	Limit in dB(W/m2) for angle of arrival (d) above the horizontal plane			Reference bandwidth
			0°-5°	5°-25°	25°-90°	
USA/ /4 MOD	<u>14.8-15.35 GHz</u>	<u>Space Research, geostationary-satellite orbit</u>	<u>-126</u>	<u>-126 + ($\delta - 5$)/2</u>	<u>-116</u>	<u>1 MHz</u>
USA/ /5 MOD	<u>14.8-15.35 GHz</u>	<u>Space Research, non-geostationary-satellite orbit</u>	<u>-124</u>	<u>-124 + ($\delta - 5$)/2</u>	<u>-114</u>	<u>1 MHz</u>
USA/ /6 MOD	<u>25.5-27.0 GHz</u>	<u>Space Research (space-to-Earth)</u>	<u>-115</u>	<u>-115 + ($\delta - 5$)/2</u>	<u>-105</u>	<u>1 MHz</u>

Reasons: These changes limit the emissions of the space research service in order to protect the fixed and mobile services from harmful interference.

APPENDIX 7 (WRC-2000)

TABLE 8c

Parameters required for the determination of coordination distance for a receiving earth station

USA/ /7 MOD

Receiving space radiocommunication service designation			Space Research
Frequency band (GHz)			<u>14.8-15.35</u>
Transmitting terrestrial service designations			<u>Fixed, mobile</u>
Method to be used			<u>§ 2.1, § 2.2</u>
Modulation at earth station (1)			<u>N</u>
Earth station Interference Parameters and criteria	p_0 (%)		<u>0.1</u>
	n		<u>2</u>
	p (%)		<u>0.05</u>
	N_L (dB)		<u>0</u>
	M_S (dB)		<u>1</u>
	W (dB)		<u>0</u>
Terrestrial Station Parameters	E (dBW)	A	<u>25⁽⁵⁾</u>
	in B (2)	N	<u>-8</u>
	P_t (dBW)	A	<u>-20⁽⁵⁾</u>
	in B	N	<u>-53</u>

	G_x (dBi)	<u>45</u>
Reference band-width ⁶	B (Hz)	<u>1</u>
Permissible interference power	$P_r (p)$ (dBW) in B	<u>-216</u>

Reasons: Provides the characteristics of the receiving SRS earth station in the 14.8-15.35 GHz band for coordination with transmitting fixed and mobile service stations. No change to the Table 8c notes is required.

USA/ /8 **NOC**

Notes to Table 8c

Reasons: No change to the Table 8c notes is required.

TABLE 8d

Parameters required for the determination of coordination distance for a receiving earth station

USA/ /9 **MOD**

Receiving space radiocommunication service designation			<u>space research</u> (4)	<u>space research</u> (5)
Frequency band (GHz)			<u>25.5-27.0</u>	<u>25.5-27.0</u>
Transmitting terrestrial service designations			<u>Fixed, mobile</u>	<u>Fixed, mobile</u>
Method to be used			<u>§ 2.2</u>	<u>§ 2.1</u>
Modulation at earth station ⁽¹⁾			<u>N</u>	<u>N</u>
Earth station Interference parameters and criteria	p_0 (%)		<u>0.1</u>	<u>0.1</u>
	n		<u>2</u>	<u>2</u>
	p (%)		<u>0.05</u>	<u>0.05</u>
	N_L (dB)		<u>0</u>	<u>0</u>
	M_S (dB)		<u>6</u>	<u>6</u>
	W (dB)		<u>0</u>	<u>0</u>
Terrestrial station parameters	E (dBW) in B ⁽²⁾	A	<u>±</u>	<u>±</u>
		N	<u>42</u>	<u>42</u>
	P_t (dBW) in B	A	<u>±</u>	<u>±</u>
		N	<u>-3</u>	<u>-3</u>
	G_x (dBi)		<u>45</u>	<u>45</u>
Reference bandwidth ⁶	B (Hz)		<u>10⁶</u>	<u>10⁶</u>
Permissible interference power	$P_r (p)$ (dBW) in B		<u>-150</u>	<u>-150</u>

Reasons: Provides the characteristics in Table 8d of Appendix **S7** of receiving earth stations in the space research service to be used in determining the coordination contour with respect to transmitting stations in the fixed and mobile services.

USA/ /10 **NOC**

- (1) A: analogue modulation; N: digital modulation.
- (2) E is defined as the equivalent isotropically radiated power of the interfering terrestrial station in the reference bandwidth.
- (3) Non-geostationary mobile-satellite service feeder links.
- (4) Non-geostationary-satellite systems.
- (5) Geostationary-satellite systems.
- (6) Non-geostationary fixed-satellite systems.

Reasons: Table 8d notes, no change is required.
